JOURNAL
OF THE
WASHINGTON ACADEMY OF SCIENCES
VOL. 12 JULY 19, 1922 NO. 13

ZOOLOGY.—*Greeffiella* (Trichoderma Greeff, 1869; not Trichoderma Steph. 1835). Contributions to a Science of Nematology, XII. N. A. COBB, United States Department of Agriculture.

In 1869, Greeff described an externally peculiar and very interesting small animal form under the name *Trichoderma*. Though it proves in the end to be internally a typical nema, it is only after many years that the fact becomes fully established. The very small size of the species and the fact that the setose cuticle makes it difficult to examine the internal organs, taken together, have delayed a fuller understanding of the internal anatomy.

Opportunity has occurred to reexamine a species of this genus in a living condition, and the results are presented herewith. They serve to establish the view that the genus comprises typical nemas, in no sense transition forms; the genus presents striking relationships to the genus *Desmoscolex*, another typical nema genus whose affinities also have been long obscured in much the same way, but finally cleared up.

The name *Trichoderma* being preempted, it is proposed to commemorate Greeff's original discovery by renaming the genus after him,—Greeffiella. *G. oxycaudata* (Greeff) is retained as the type species.

Greeffiella, nom. nov.

Trichoderma Greeff, Arch. f. Naturg., Berlin, v. 35, bd. 1, 1869. Not *Trichoderma* Steph., 1835, or Swains., 1839.

Greeffiella dasyura n. sp. $\frac{1.3}{3.4}\ \frac{10.4}{9.6}\ \frac{13.}{13.}\ \frac{56.}{15.}\ \frac{70.}{9.8} > 0.31$. The thin layers of the transparent, colorless, hairy cuticle are traversed by about fifty-six plain transverse annules, easy of resolution, which are not materially altered on the lateral fields. The number of annules corresponds with the number of encircling rows of somatic setae. While there are no wings opposite the lateral fields, wing spaces are faintly indicated by a slight spareness, or absence, of setae near the lateral lines; this however is a faint feature extending only from the neck to the anus, and is perhaps more pronounced on the female than on the male. The contour of the body is crenate, especially toward the head. There appear to be toward thirty small unequal cephalic setae on the front of the head, disposed, apparently, in two closely approximated circlets. These setae average to be about as long as the head is wide

and are apparently too numerous and crowded to permit of any exact order; however, about twelve of the anterior ones are spread outward and forward while all the others spread out more or less backward. These somewhat curved, rather slender, tapering, acute, somewhat stiff cephalic setae are of the same character as the great bulk of the somatic setae. Among the somatic setae however are a few relatively large, hollow, open bristles of another character, resembling the locomotor bristles found on *Draconema*, *Desmoscolex*, etc. For instance, on the third and eighth annule of the female, and on the second and seventh annule of the male, that is to say in the rows of setae on these annules, there occur subdorsal (on the second and third annules) and dorsally submedian (on the seventh and eighth annules) pairs of spreading tubular open-mouthed setae, or bristles, a little longer than the regular somatic setae. These special setae have extra large bases and are probably connected with glands. The rows of ordinary cervical setae have a fringe of shorter setae in their midst. As before remarked, the somatic setae are in fifty-six or fifty-seven transverse rows,—excluding those on the head, but counting the finely pilose region in front of the spinneret as two annules. See Fig. 3. Passing backward, the setae grow steadily longer from the head to the tail; the posterior ones are about one and one-half times as long as the spinneret, while the anterior ones are somewhat shorter than the spinneret. Back as far as the beginning of the intestine, the rows of setae present minute toothed fringes, accentuating the annules. The conoid neck ends in a rounded, somewhat flattish hemispheroidal head, set off by a narrow, deep and distinct constriction. The lips are amalgamated and fixed. Nothing is known concerning the labial papillae. The pharynx is exceedingly minute and easily overlooked, but is, in fact, a minute, simple, obscure, straight, regular, tubular, closed, unarmed region about one-sixth as wide as the head and twice as long as wide; these measurements include its enclosing pharyngeal tissue. Under ordinary circumstances there is to be seen here only a closed lumen. Passing backward from the pharynx, the oesophagus for a distance two and one-half times as great as the width of the head, is cylindroid; however, it widens slightly,

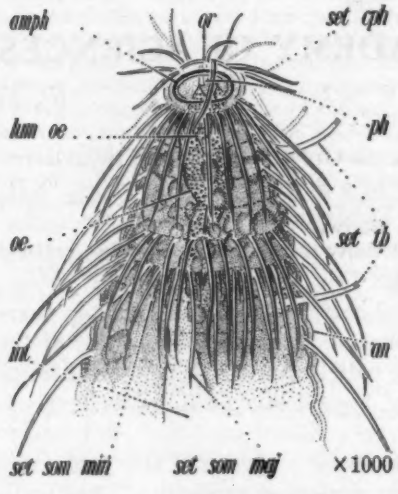

Fig. 1.—Head end of *Greeffiella dasyura*. The setae on several annules immediately behind the head have been omitted so as to show internal details more clearly. *amph*, amphid; *an*, annule; *int*, location of the beginning of the intestine (see also Fig. 2.); *lum oe*, lumen of the oesophagus; *oe*, oesophagus; *or*, mouth opening; *ph*, pharynx; *set cph*, cephalic setae,—a number of which are omitted; *set som maj*, one of the larger somatic setae; *set som min*, one of the smaller somatic setae; *set th*, tubular seta.

so that it becomes as wide as the head, or one-half as wide as the corresponding portion of the neck, that is to say that portion of the neck marked by the fifth circlet of cervical setae. At this point there is a rather faint diminution of the oesophagus, which continues thence a little narrower, afterward widening out, and then soon coming to contain granules like those found in the cells of the intestine. This latter appears to begin about opposite the tenth row of setae. There are two narrow ducts, one emptying into the posterior part of each amphid; these ducts can be followed backward to near the pigmented bodies soon to be mentioned, and possibly may be connected with them. The external expressions of the amphids, each of which is symmetrical to two lines, are of unequal diameter, without central markings, and are located toward the front of the head; they are about as wide as the corresponding portion of the head, each being about twice as wide as long. The two greenish pigmented bodies mentioned above (org?, Fig. 2), are olive green in color and present a nucleus in the midst of a colorless spherical cell (?) as wide as one of the cuticular annules in the immediate vicinity. These bodies are naturally rather difficult to observe on account of the hairy nature of the cuticle through which they are viewed; they are located well outside the intestine, one on each side of the body, somewhat behind the base of the neck. The broad cardiac constriction lies opposite the eighth to tenth rows of setae, and is about as wide as the distance between these rows. The thick-walled intestine presents a faint lumen and is composed of cells of such a size that about twelve occur in each cross section. In the male, at least, the intestine gradually becomes one-half as wide as the body. There is no pre-rectum. From the minute anus, whose anterior lip is somewhat elevated, the inconspicuous rectum extends inward at right angles to the ventral surface half way across the body; the intestine itself extends past the anus. No anal muscles are to be seen. There are two kinds of colorless granules of variable size to be seen in the cells of the intestine; the largest of these have a diameter equal to the distance between the rows of somatic setae; the finest of the granules are exceedingly fine. The granules are not so arranged as to give rise to a tessellated effect. The more or less convex-conoid tail tapers from in front of the anus to the tubular spinneret, which comprises two-sevenths of the whole

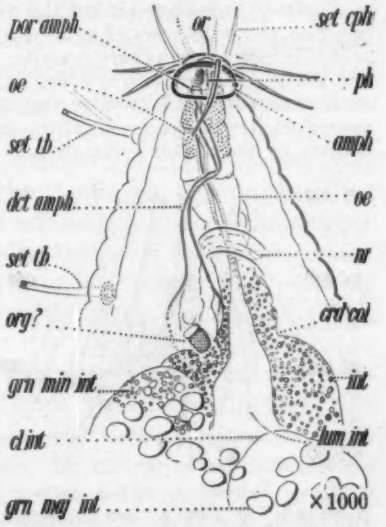

Fig. 2.—Internal anatomy of the head end of *Greeffiella dasyura*. Lettering as in Fig. 1. *cl int*, one of the cells of the intestine; *crd col*, cardiac collum; *dct amph*, duct connecting with the amphidial pore; *grn maj int*, one of the larger intestinal granules; *grn min int*, smaller intestinal granules; *int*, intestine; *lum int*, lumen of the intestine; *nr*, nerve ring; *org ?*, organ of doubtful significance; *set th*, tubular seta.

tail. This tubular spinneret is about as wide as one of the spicules of the male; it is a simple truncate affair which tapers but very little. A marked peculiarity of the posterior extremity of the nema is the existence of numerous minute setae; for a distance equal to the length of the spinneret the setae on the portion of the tail immediately in front of the spinneret are very much reduced and more numerous. The spherical caudal glands are located behind the anus in the anterior fourth of the tail and empty through separate ducts; each is about one-fifth as wide as the corresponding portion of the tail, or as wide as one of the somatic annules opposite. Only two nuclei were seen in connection with these glands, and these were located in the vicinity of the anus, their number indicating that the number of caudal glands may be less than the usual three. The excretory pore lies near the nerve-ring opposite the sixth annule in the male and opposite the seventh in the female; its spherical ampulla is one-fourth as wide as the corresponding portion of the neck. The nerve-ring surrounds the oesophagus somewhat obliquely where it first diminishes in diameter somewhat behind the middle. In the dorsal side of the neck, opposite the 9–14 rows of setae there are some relatively large organs,—probably two or more finely granular cells. From the somewhat inconspicuous, small, elevated vulva, which is surrounded by minute setae, the small, weak, non-cutinized, tubular vagina leads inward at right angles to the ventral surface about one-third the distance across the body. Little is known concerning the double symmetrically reflexed female sexual organs.

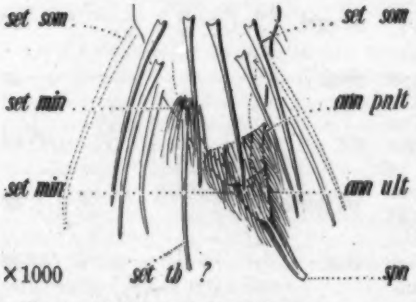

Fig. 3.—Tail end of *Greeffiella dasyura*. Lettering as in Figs. 1 and 2. *ann pnlt*, penultimate annule; *ann ult*, ultimate annule; *spn*, spinneret.

$$\frac{1.5}{3.2}\quad\frac{6.6}{7.7}\quad\frac{10.6}{11.}\quad\frac{'14}{18.}\quad\frac{76.}{11.}>0.34..$$

The slightly arcuate, irregularly conoid, faintly sigmoid tail of the male, on the whole, rather resembles that of his mate. The two equal, straight, very slender, uniform, acute, colorless spicula, which are slightly cephalated by expansion, are about one and one-fourth times as long as the anal body diameter. If swung around behind the anus, they would just about reach to the base of the spinneret; they are about twice as wide as the bases of the somatic setae, are a little larger distally than elsewhere, and are perhaps winged. No gubernaculum has been seen. On the fifth and eleventh annules in front of the anus occur ventrally submedian papilla-like organs, indicated by the presence of minute setae arranged in a cluster about a nerve ending (?),—about ten setae on the fifth annule and a much smaller number on the eleventh. There are also similar ventrally sublateral bunches of setae on the annules preceding the large (duplex?) conical one bearing the spinneret. On the lateral field near the middle of the male, a bunch of minute setae was observed like those on the fifth annule in front of the anus. The nature of these special organs, for such they must be, remains in doubt. It seems quite possible that some of them are male supplementary organs. The wide cylindrical testis is one-half as wide as the body and is reflexed to near the proximal ends of the spicula.

Habitat: Found in sponges, Biscayne Bay, Florida, U. S. A., March, 1916. Male examined and measured in a living condition; female fixed in Flemming's solution and soon after examined and measured in water. The form of the pharynx and oesophagus; the presence of special tubular setae; the structure of the spinneret, and the relatively small number of annules, seem to indicate a closer relationship of *Greeffiella* with *Desmoscolex* than has been hitherto imagined. Perhaps *Greeffiella* should be placed in the same family with *Desmoscolex*, *Tricoma*, etc.

ETHNOLOGY.—*Some new ethnologic data from Louisiana.*[1] DAVID I. BUSHNELL, JR.

The following brief notes were secured by the writer during January and February, 1922, from a woman named Rose Deruisé, who was born near New Orleans January 6, 1834. She claims to be, and probably is, three-fourths Indian, her mother having been a full blood and her father a half blood. The early years of her life were spent at an Indian village a few miles west of New Orleans, situated between the left bank of the Mississippi and the south shore of Lake Pontchartrain, in the northern part of Jefferson Parish, Louisiana. During the Civil War the site of the native settlement was occupied by a Federal camp, known as Parapet camp, and it appears that after the war the settlement no longer existed as it had in earlier years. The following notes record the manners and customs of the people of the native village during the years preceding the war.

It is now difficult to identify the tribe to which my informant belonged. She says that her people often visited the Choctaw who then lived across Lake Pontchartrain, and that all spoke the same language, although in some instances the names of certain objects and of plants and animals differed. This may have been a small detached settlement of the Choctaw and may have occupied the site of a more ancient village of the old Washa tribe after the latter had become scattered. According to Bienville the Washa spoke Chitimacha, but it is possible that remnants of the tribe later adopted the language of the Choctaw. Possibly my informant was descended from some of these, and many of the peculiar customs and ways of life related by her may have been those of the ancient Washa.

Habitations.—Some structures were circular and others rectangular, and in addition to these a sloping single roof was supported by posts—a lean-to which served as shelter from sun and rain. All were thatched

[1] Received June 6, 1922.

on top and sides with palmetto leaves. Mats made of rushes were often used on the inner walls of the more elaborate structures.

In addition to the village which stood a short distance west of New Orleans, the old woman recalled a camp site on the southeast shore of Lake Pontchartrain, about 12 miles northeast of New Orleans, at Petit Bois, or Little Woods. It was here that the Indians stopped when preparing to cross the lake in their canoes, and it was likewise the landing place when they arrived from the opposite shore. Fragmentary pottery, bits of animal bones, etc., discovered in 1916 and 1917, indicated the position of this old camp ground.

Food.—Strips of venison, ducks, etc., were dried or smoked and so preserved for future use. All were first thoroughly cleaned and salted, then strung on cords and suspended between two trees or posts, and a fire kindled on the ground beneath. The warmth and smoke would soon dry the meat. Shrimp were dried in the sun after first being placed in scalding water to harden the meat. Fish were prepared by first being thoroughly cleaned, and after a quantity of salt was rubbed on the flesh they were piled one upon another in a large wooden tray and held down by a heavy weight. In this position they were allowed to remain for ten days or two weeks, during which time they would become quite dry, the moisture being pressed from them. Next they were strung on cords that passed through the tails, the ends of the cords were fastened to trees or posts, and the fish thus suspended were more completely dried and cured by the smoke and heat of small fires kindled on the ground under them.

All vegetables obtainable, such as potatoes and pieces of pumpkins, were boiled in a large pot with rabbits or squirrels, or pieces of meat of any sort.

Filé was prepared by pounding in a wooden mortar the dried leaves of *Sassafras variifolium*.

Leaves of the yaupon (*Ilex vomitoria*) were boiled in water and the liquid was used as a beverage like ordinary tea. The leaves were used either green or dried. Milk was added to the drink when it could be obtained.

The favorite method of preparing corn was to allow the whole grains to remain in water overnight, or until they would swell and the husks become softened and loosened. The husks were then removed and the grains crushed in a wooden mortar to form a thick paste. The paste or crushed grain was later boiled in water and so eaten.

Caches.—Caches were used extensively and every family had one or more. Quantities of dried fish and venison, supplies of various sorts, dressed skins, etc., were deposited in caches, and when so hidden would seldom be found except by their owners. Caches were prepared by making an excavation in dry ground and lining it with a large number of palmetto leaves. The material to be protected was placed in a crude box or wrapped in bark and placed in the pit. More palmetto leaves were then placed on top and they in turn were usually covered with an old blanket or one or more skins. All was then covered with earth or sand and made to resemble the surrounding surface. When the house was occupied similar pits were used to hold the potatoes, hides, and other possessions of the family, but they were not so carefully closed and protected.

Dress and personal decoration.—Tattooing was practiced extensively by the people of two or more generations ago. The skin was pricked with a needle, or with several needles tied together, and the surface thus punctured rubbed with soot which had been mixed with oil or some kind of grease. The women, after marriage, often had a dot tattooed near the corner of the mouth. The hands, arms, and neck were likewise decorated.

Pins, brooches, earrings, and other ornaments were made of silver coins hammered thin, then cut and trimmed to the desired shape and size.

Skin dressing.—Some skins were prepared for various uses without removing the hair or wool. They were stretched in a frame or over some firm surface as soon after being removed from the animal as possible, otherwise they would become hard and dry. When properly stretched, a quantity of dry corn meal was rubbed on the flesh side to absorb all the oil and grease, the surface was scraped with a sharp implement to remove the particles of flesh, more corn meal was rubbed in, and the surface again scraped. Soon the entire skin would become soft and pliable. If it was desired to tan the skin with the hair removed, the latter was first singed with a hot coal or moved quickly over a small flame until it could be rubbed off, then both sides of the skin were treated with corn meal and scraped, as described above. The implement used in scraping the skins resembled a long chisel, made of hard wood and beveled at one end.

Pottery.—Earthenware vessels were made and used for many purposes. Three sorts of clay were known, black or gray, white, and red,

but red was considered the best, as it could be burned hardest. The clay was first mixed with water, only enough being used to make a heavy pasty mass. A quantity of the clay was then pressed over some smooth round object, a gourd of the proper size being preferred. The mold was then removed and the clay carefully worked into shape, being pressed, expanded and thinned, more clay being added as necessary, and the whole mass gradually assumed the desired form. The vessel was allowed to dry slowly in the air. The surfaces were then smoothed by scraping with a shell and incised decorations were added if desired. Neither crushed shell nor sand was mixed with the clay. Tobacco pipes were often made of white clay. The pipes were usually covered with oil or grease before burning, which caused them to turn black. After burning, they were polished. Vessels were likewise made black, and with use acquired a high polish.

The method of burning pottery vessels was this: a hole was made in the ground, the bottom and sides of which were covered with dry grass and bits of bark and wood. The vessels, thoroughly dried, were then placed in the hole and covered with similar grass and bits of bark and wood. This was ignited and lightly covered to cause it to burn slowly. When the fire subsided the earthenware was sufficiently burned.

Mortars and pestles.—Wooden mortars and pestles were made and used for various purposes, especially for crushing corn and preparing filé. The mortars were from 2 to 3 feet high. The cavity was made by burning the wood and chopping away the charred particles. When of the desired size the inner surface was scraped and smoothed and all the burnt wood removed.

Baskets.—Baskets of several forms were made of split cane. Dyes were prepared from roots and barks, but my informant could not remember the names of the roots.

Spoons.—Spoons were made of cow horns and were used extensively. They were called *Mooconá*.

Needles.—Needles 4 inches or more in length were made of dogwood, or other woods if dogwood could not be obtained. The needles were very sharp pointed and perforated to receive the thread, and very good work could be done with them.

Threads.—Threads of sinew were used in sewing skins and for other purposes. They were made of the intestines of various animals, that of the deer being preferred. The threads and larger strands were often

made very long by splicing several pieces and twisting them before they became dry. One end would be fastened to a tree and the line pulled and stretched.

Cords.—Spanish moss, after being properly prepared, was used in making ropes and lighter cords. Some were made by twisting, others by braiding.

Saddles.—Saddles, or pads used as saddles, were made by weaving the soft cords of moss.

Weapons.—Blowguns and bows and arrows were made and used. Blowguns were made of pieces of cane, the perforation being formed by first preparing a long, slender piece of hard wood and forcing it down one end of the cane and then down the other until the entire length was open and clear. Darts were made of pieces of hard pine, worked and smoothed, then tufted with some soft material.

Transportation.—Canoes were made of a single log, cypress being the favorite wood. Canoes, or dugouts, 20 feet in length and 3 feet in width were not uncommon, although much smaller ones were used on the shallow, narrow bayous. The larger canoes were used in crossing Lake Pontchartrain, and when the weather was favorable sails made of one or more deerskins would be raised.

Burials.—The bodies were wrapped in blankets or skins and carefully placed, in an extended position, in graves which had been thickly lined with palmetto leaves. A quantity of similar leaves were placed over the bodies and all was covered with earth or sand.

It is to be regretted that more could not have been learned of the manners and ways of life of the people of this native settlement, which evidently existed until some sixty years ago. Nor is it now possible to give the name of the tribe or tribes to which the people belonged, but it is more than probable they were Muskhogean closely allied with the Choctaw whose villages stood on the northern shore of Lake Pontchartrain.

BOTANY.—*Notes on marsh and aquatic plants of Missouri.*[1] F. P. METCALF, Biological Survey. (Communicated by A. Wetmore.)

During the summer of 1920 the writer was engaged in an extensive survey of the marsh and aquatic plants of Missouri for the Biological Survey, U. S. Department of Agriculture. The results of this work were so interesting from the standpoint of plant distribution that it

[1] Received June 5, 1922.

is thought advisable to make known the most salient features in a preliminary paper.

Ten species of plants collected by the writer had not previously been reported in the State. These are as follows: *Alisma brevipes* Greene; *Hemicarpha aristulata* (Coville) Smyth; *Naias guadalupensis* (Spreng.) Morong; *Nymphoides peltatum* (S. P. Gmel.) Britten & Rendle; *Paspalum plenipilum* Nash; *Potamogeton crispus* L.; *P. friesii* Rupr.; *P. heterophyllus* Schreb.; *Ruppia maritima* L.; *Rynchospora corniculata* (Lam.) A. Gray.

The majority of these plants are from stations that fall well within the range of manuals covering the region, from which they have been omitted, in most cases, from lack of intensive work on the marsh and aquatic flora of the state. *Naias guadalupensis* and *Potamogeton heterophyllus* are good examples of this, as they were found in a number of lakes. Most interesting of all, however, were the plants whose known range did not previously extend into Missouri. Of these there may be mentioned first *Nymphoides peltatum*, formerly known to be naturalized only in the vicinity of Washington, D. C.; an unpublished report for this plant from Louisiana,[2] as well as that of the writer from Missouri, extend its range to the southwest for a considerable distance. Another species, *Potamogeton friesii*, was previously unknown south of Minnesota, Wisconsin and Michigan. The known range of *Alisma brevipes* is extended southeastward, as formerly it was not recorded east of North Dakota, Nebraska and New Mexico, while *Hemicarpha aristulata* was found at the extreme eastern border of its range.

Besides those that have been mentioned, new locality records are given for a few other plants that for the most part are decidedly rare throughout Missouri, where their distribution is inadequately known. In these two categories are: *Eleocharis quadrangulata* (Michx.) Roem. & Schult.; *Panicum bicknellii* Nash.; *Potamogeton amplifolius* Tuckerm.; *P. foliosus* Raf.; *P. pectinatus* L.; *Sagittaria brevirostra* Mackenzie & Bush; *Utricularia minor* L.

Complete data for all plants mentioned, with actual citations of specimens collected, will be found in the subjoined list. It may be well to add that in all cases where the collector is not cited, the plant was collected by the writer. All specimens have been placed in the U. S. National Herbarium at Washington.

A list of the more important local and state floras for Missouri has

[2] See annotated list below.

also been appended among which the *Flora of Missouri* by Tracy (24), the only general catalogue for the state, is now somewhat incomplete and out of date, as it was published in 1885. Among local and county floras those of greatest value are that for Columbia and vicinity by Daniels (8); for Jackson county by Mackenzie and Bush (14); St. Louis and vicinity by Eggert (9), Engelmann (10), Hus (13), and the Engelmann Botanical Club (28). The southeastern counties have been discussed by Bush (4) and Uphof (25). The trees and shrubs are treated by Broadhead (2), Bush (6) and anonymously (29). A few miscellaneous papers of interest have been included in addition to those mentioned.

There is no doubt that the number of new plants here added to the flora of Missouri is small in comparison with those that will be found when extensive general collections are made. The Ozark region of the southwest and the swampy region of the southeast are incompletely known. The latter region may be worked profitably by anyone as it will yield important data bearing on many interesting problems in southern and northern distribution.

LIST OF PLANTS

Alisma brevipes Greene. Not previously recorded from the state. Range here extended southeastward; formerly unknown east of North Dakota, Nebraska and New Mexico. Fairly common in lake near Lake City, Jackson County (No. 1030, September 25, 1920).

Eleocharis quadrangulata (Michx.) Roem. & Schult. This plant was reported (28) from Allenton and Pinks Lake near St. Louis but a recent publication (27) states that these stations as well as that of Dozier (which is represented in the U. S. National Herbarium by a sheet collected by George W. Letterman) have been destroyed by drainage and cultivation. The National Herbarium has three other sheets of this rare plant, one from Paddy's Lake, Oswego County, N. Y., July, 1882, by C. S. Sheldon, and two others from Goose Pond, August 20, 1912, and Pond at the Frisco Shops, September 2, 1912, both near Springfield, Mo., collected by P. C. Standley (Nos. 9042, 9777). The writer found this plant exceedingly abundant in Iron Mountain Lake, Iron County (830, August 9, 1920), where in shallow water it formed a complete band around the whole lake.

Hemicarpha aristulata (Coville) Smyth. Not previously recorded from the state. Rare along the sandy border of Lower Contrary Lake, Buchanan County (1006, September 20, 1920). This represents almost the eastern limit of the range of this plant.

Naias guadalupensis (Spreng.) Morong. Not previously reported from the state which, however, comes within the commonly given general range. Common in Kilarney Lake, Iron County (No. 844, August 8, 1920), Little Bean and Bean Lakes, Platte County (No. 1019, September 22, 1920), and rare in Katy Allen Reservoir, Nevada, Vernon County (No. 969, September 9, 1920), and Loch Lin Lake, St. Louis, St. Louis County (No. 821, August 5, 1920).

Nymphoides peltatum (S. P. Gmel.) Britten & Rendle. Not previously recorded from the state. The U. S. National Herbarium has only four sheets of this rare plant. Two of these from near Washington, D. C., from a station where the plant is now extirpated, are from the only locality mentioned for this plant in the 7th edition of Gray's Manual, and in Britton and Brown's Illustrated Flora. One of these specimens was secured August 7, 1894, by A. Fredholm (No. 637), the other on September 27, 1895, by C. L. Pollard (No. 710). The other two sheets come from Gretna, Louisiana, collected May 12, 1899, by C. R. Ball (No. 378), and a pond near St. Louis, Missouri, collected August 21, 1904, by M. W. Lyon, Jr. The writer found this plant abundant in a small pond in Ironton, Iron County (No. 826, August 9, 1920).

Panicum bicknellii Nash (*P. bushii* Nash). Fairly common near Prairie Lake, Papenville, Bates County (No. 980, September 10, 1920). Collected by B. F. Bush, McDonald County, July 24, 1893 (No. 413) and described as a new species, *P. bushii* by Nash (26); possibly the only other record for the state for this rare plant is that of a specimen from Eagle Rock, in the National Herbarium, also collected by B. F. Bush (No. 3246) on August 14, 1905.

Paspalum plenipilum Nash (*P. praelongum* Nash). Fairly common along border of lake near Cedar Gap, Wright County (No. 915, August 26, 1920); not previously recorded although Missouri comes within the range commonly given. The species is also represented in the U. S. National Herbarium by a single sheet from Missouri taken at Paw Paw Junction, September 4, 1877, by B. F. Bush (No. 213).

Potamogeton amplifolius Tuckerm. Not definitely recorded[3] before from the state, although Missouri comes within the general range commonly given. Common in Gravais Mills Lake, Morgan County (No. 888, August 23, 1920), and rare in Hahatonka Lake, Camden County (No. 929, August 27, 1920); in both cases the lakes were fed by cold springs.

Potamogeton crispus L. Not previously recorded from the state; represented in the U. S. National Herbarium by two sheets from Hatchery Ponds, Neosho, Newton County, May 28, 1903 (deposited by Fish Commission). This plant was also collected by the writer (No. 948, September 6, 1920) from the same locality where it has long been established.

Potamogeton foliosus Raf. Apparently common throughout the state, being recorded or collected from Bell Lake, Boone County (No. 869, August 21, 1920); Gravais Mills Lake, Morgan County (No. 885, August 23, 1920); Seequeeota Lake, Springfield, Green County (No. 935, August 29, 1920); Logan Pond, Billings, Christian County (No. 940, September 4, 1920); Lake near Rich Hill, Bates County (No. 993, September 10, 1920); Bean Lake, Platte County (No. 1020, September 22, 1920); Crescent Lake, Excelsior Springs, Clay County (No. 1057, October 2, 1920) and Cemetery Lake, Macon, Macon County (No. 1080, October 9, 1920). Apparently only known[4] previously from Hiffner's Lake, near Alberton, Jackson County (3), a record undoubtedly based on a sheet in the National Herbarium collected by B. F. Bush (No. 618, July 9, 1896). The National Herbarium also has specimens from Poplar Bluff, July 27, 1892, *H. Eggert;* Turner, Green County, September

[3] Reported by Eggert (9), but it is not definitely stated whether the locality was in Missouri or Illinois.

[4] Reported by Eggert (9) and also anonymously (28) in vicinity of St. Louis, but it is not definitely stated whether the locality was in Missouri or Illinois.

5, 1912, *P. C. Standley* (No. 9845), and Springfield, August 20, 1912, *P. C. Standley* (No. 9061).

Potamogeton friesii Rupr. Fairly common at Hahatonka Lake, Camden County (No. 923, August 27, 1920). This and a specimen collected by J. W. Blankinship in Howells County in 1888 in the U. S. National Herbarium are the only two recorded from the state; both extend the range of this plant southward.

Potamogeton heterophyllus Schreb. Fairly common in Normandy Golf Club Ponds, St. Louis County (Nos. 787–788, July 29, 1920); Loch Lin Lake, St. Louis County (No. 819, August 3, 1920); Kilarney Lake, Iron County (No. 845, August 8, 1920); Iron Mountain Lake, Iron County (No. 842, August 9, 1920); pond near Rolla, Phelps County (No. 853, August 12, 1920), and Bean Lake, Platte County (No. 1018, September 12, 1920). Not previously reported from the state; represented in the National Herbarium by a single sheet, from Goose Pond, Springfield, September 2, 1912, collected by P. C. Standley (No. 9780).

Potamogeton pectinatus L. Fairly common throughout the state, being recorded or collected from Big Creve Coeur Lake, St. Louis County (No. 782, July 27, 1920); Upper Contrary Lake, Buchanan County; Mud Lake, Buchanan County (No. 1011, September 21, 1920); New Made Lake, Buchanan County; Sugar Lake, Platte County; Bean Lake (No. 1017, September 22, 1920), Little Bean and Duck Lakes, Platte County. Previously recorded (28) from Arloe, Meramac Highlands, and Creve Coeur Lake, St. Louis County, and possibly by Eggert (9). There is also one additional specimen in the National Herbarium from Gascondy, July 21, 1914, *W. H. Emig* (No. 223).

Ruppia maritima L. Not previously recorded from the state. Common in Clinton Club Lake, Clinton, Henry County (No. 905, August 24, 1920). Possibly introduced but growing vigorously; establishment of the plant here undoubtedly due to the salinity of the spring flowing into the lake.

Rynchospora corniculata (Lam.) A. Gray. Fairly common along Black River, Fagus, Butler County (No. 691, July 10, 1920). Previously reported only from Butler County by Letterman (24). However, there are in the U. S. National Herbarium specimens from Paw Paw Junction, September 4, 1897, *B. F. Bush* (No. 219); St. Louis, July 27, 1892, *H. Eggert;* and Campbell, September 9, 1910, *B. F. Bush* (No. 6302).

Sagittaria brevirostra Mackenzie & Bush. Common in Cooley Lake, Clay County (Nos. 1043–4, October 1, 1920); this lake is only about 20 miles from the type locality for this rare and interesting plant, at Courtney (17), Jackson County, where it was collected by B. F. Bush (No. 2175) August 14, 1904, and October 10, 1903. A specimen (*Bush* 1917) collected on the latter date is the only sheet in the National Herbarium.

Utricularia minor L. Previously reported from St. Louis by Riehl (24) and East St. Louis, Illinois (28). Rare, only found in Duck Lake, Platte County (No. 1025, September 23, 1920). The National Herbarium has no other specimens from this or adjacent states.

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PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

BIOLOGICAL SOCIETY

635TH MEETING

The 635th meeting was held at the Cosmos Club on Feb. 18, 1922, with Vice President OBERHOLSER in the chair and 101 persons present. The program was as follows:

ROBERT M. YERKES: *The behavior of monkeys and apes.*

The speaker had spent much of a sabbatical year in California where he had opportunities to study several species of monkeys and one young orang about five years old. He devoted much time to testing the intelligence of the latter and two individuals of different species of monkeys, also making observations of other individuals and species. Apparatus was constructed in such a way that the animal entering a room was confronted with a series of doors, on entering one of which he would obtain food. Part of the doors being open and part closed, it was possible to establish a certain relation between the open doors and the right one, or the one leading to the food. The problem was to see if the animal in a large number of trials would come to perceive the relation, so as to go at once to the right door. Although the monkeys solved some of these problems in less time than the orang, the speaker thought that the latter showed more of the human manner of investigation. A large number of lantern slides made the method clear and furnished many illuminating and some very amusing glimpses of the animals involved.

Dr. T. S. PALMER in discussing the paper pointed out the prime importance of a knowledge of the previous history of the monkey under study, as by cruel treatment they may become totally changed in disposition. The whole bringing up of the animal is involved, if any normal plane of intelligence is to be demonstrated.

Under *Short notes*, Dr. BARTSCH mentioned that for five weeks he has had as a visitor to his feeding pan a Brazilian cardinal. Where it came from is unknown. Among other birds that he is feeding he mentioned about 350 starlings.

Dr. PALMER showed a check list of the birds of Africa, lately completed, and spoke of a cooperative plan by which similar lists for other world regions are being completed.

636TH MEETING

The 636th meeting was held at the Cosmos Club on March 4, 1922, with President VERNON BAILEY in the chair and 64 persons present. LAURENCE M. HUEY, of San Diego, Cal., was elected a member of the Society.

Under the head of *Short notes*, Dr. T. S. PALMER announced that the National Audubon Society has lately received a gift of $200,000 for endowment, making the total endowment $600,000 at the present time. He also called attention to the fact that the governor of New Jersey has lately declared the bobolink a non-insectivorous bird; this reminded the speaker that in earlier times the quail was officially classified in Ohio as a song-bird and in South Carolina the bat was determined to be a migratory bird.

He also read a letter from W. B. ALEXANDER, an Australian ornithologist.

Dr. HOWARD told of the 9th annual meeting of the New Jersey Mosquito

Extermination Association. The organization is thriving and enthusiastic, and has accomplished a great deal in removing from New Jersey the stigma of being the home of the mosquito.

Mr. ALDRICH spoke of recent additions to the knowledge of the peculiar Australian parasitic flies of the genus *Palpostoma*, several specimens of which have lately been received at the National Museum. They attack beetles which are injurious to sugarcane, and have considerable economic importance.

Dr. OBERHOLSER reported that during the recent deep snow many species of birds came about his home near Zoological Park, evidently forced by the snow to search for food in unaccustomed places; they disappeared in two days as the snow went away.

Pres. BAILEY said that while in Southern Arizona last winter he had observed that a certain kind of tuber was eaten by rodents to a notable extent. He brought home samples for identification; they grew while lying on his table in a box, perfectly dry. The plant is *Talinum angustissimum*.

Vice President OBERHOLSER taking the chair, President BAILEY presented a paper on *Raising baby beavers*.

The speaker told of experiments in raising young beavers while studying for the Biological Survey the problems relating to beaver farming. He showed lantern slides of the young taken in Northern Minnesota and Wisconsin and raised from the time when their eyes had just opened until well grown, about three months old,—or until he left there in September. The home habits of the young were described, and the manner in which they took to human ways of life, even to the regulation baby bottle of milk, which they were shown absorbing with great relish. They were most affectionate and lovable pets, adopting their foster parents as fully as they were themselves adopted; crying in real baby fashion when hungry or cold, and sure of having all their wants supplied, night or day. They soon learned to come when called, and though reluctantly would return to their little beaver house on the hill near the cabin. Their great delight was to be rocked to sleep in a soft warm lap, or on a cold night to be wrapped in a blanket and taken into a warm bed, where they would cuddle up close and go to sleep as soon as they had finished their bottle of milk.

Although well covered with deep soft fur, they were sensitive to cold, especially if exposed to cold wind. Slides were shown of some beaver houses with thick walls and warm inner chambers, also of beaver dams and ponds, and some of the mature beavers taken alive for study of habits.

In conclusion Mr. Bailey considered beavers easily raised in captivity, gentle and intelligent, promising well as domestic animals.

Mr. BAILEY resumed the chair and Mr. A. S. HITCHCOCK gave the second paper of the evening, *Botanical notes from the Orient*.

The speaker had made a trip to the Philippines, China and Japan, leaving Washington on April 25, 1921, and returned to the city on Dec. 24. About one-third of the intervening time had been consumed in travel. A month was spent in the vicinity of Manila. In this region Mt. Makiling near Los Banos is the best accessible collecting ground for a botanist. The worst drawback here was the abundance of leeches. Baguio was a good place for grass collecting. Omitting China to save time, the speaker described his experiences in Japan, where he traveled on foot with a native botanist as guide and interpreter, thus having an opportunity to live among the Japanese as foreigners rarely do. Lantern slides were shown to illustrate various places visited

and interesting vegetation. Japan is poor in grasses except bamboos; these however occur in wide variety. The speaker showed various articles made of wood, cocoanut shells, etc.

637TH MEETING

The 637th meeting was held at the Cosmos Club on March 18, 1922, with Pres. BAILEY in the chair and 62 persons present.

Under *Short notes*, Dr. H. M. SMITH showed a photograph of an extraordinary crustacean, the rock lobster or salt water crayfish; the specimen at the National Museum was lately received from Sarasova, Fla. It is 36 inches long, including the antennae, and weighed 12 pounds.

He also showed a map of Iceland from the *Theatrum Orbis Terrarum*, published in London in 1606, the work of Abraham Ortelius. All around the island were drawn sea monsters, which were described in the text, which the speaker read.

Dr. HOLLISTER announced the arrival at the Zoological Park of a giant anteater from South America, and described its habits.

Dr. T. S. PALMER spoke of several birds lately introduced into the United States: a Chinese dove at Los Angeles, and at Tacoma the oriental Bamboo Partridge, of which 300 were brought in at one shipment.

Dr. OBERHOLSER reported that at Polksville, in southeastern Iowa, several thousand wild ducks, mostly mallards, have remained all winter, the inducement being regular feeding with corn. They have become quite tame. The starling, he added, has been imported from Asia into Vancouver Island, and is spreading.

Mr. HITCHCOCK spoke on the membership campaign now in progress.

The first paper of the evening was read by Dr. PAUL BARTSCH, on *American shipworms*.

The shipworm is not a worm at all, but a mollusk, related to the oyster and clam. The speaker gave an account of the structure and life history of these animals, using as his example Gould's Ship-worm, the life history of which was almost completely worked out by Sigerfoos in 1908 at the U. S. Bureau of Fisheries Station at Beaufort, N. C.

There are two types of shipworms in America: one which produces living young, and the other which produces eggs. Gould's shipworm is of the latter type. When the eggs hatch, a free-swimming larva is produced; this leads a pelagic existence for a time, the length of which had not been determined, and then settles down on some piece of wood and begins digging a home for itself. The first tiny puncture is just large enough to admit the minute organism, but is widened and deepened as the animal grows. Some shipworms grow to be four feet or more in length, and as thick as a man's thumb. After the burrow is complete, the end is sealed up with a calcareous lining. In fact the whole burrow has been beautifully glazed after its excavation. The mollusk has now stopped growing, and turns its attention to feeding and reproducing. A single specimen can produce from half a million to three million offspring.

The food of these animals consists, not of wood as generally supposed, but of plankton, which is strained from the water by the gills, and carried by ciliary action to the mouth.

Shipworms are very destructive. The most conspicuous loss suffered in

any American harbor was at San Francisco Bay, or San Pablo and Suisun Bay, its branches, where damage of no less than twenty million dollars was done by Beach's Teredo in 1919–1920. An equal loss is probably sustained annually along our various coasts. At Smith island in Chesapeake Bay a wharf collapsed within a period of three months after it was constructed. Recently attention has been called to the ravages of shipworms in the Panama Canal region, where on the Atlantic is the huge borer known as Reyne's Shipworm which freely attacks greenheart timber, a supposedly immune wood; while a closely related species affects the fresh waters of Miraflores Lake on the opposite side. This is the first fresh-water shipworm known from American waters. Zetek's Shipworm is another destructive Panama kind.

Twenty-eight species were listed by Dr. Bartsch from American waters, with data on distribution and other notes; there are also at least five other species known only from fragmentary specimens.

The speaker showed specimens of various kinds, and wood bored by them. He stated that there are four distinct problems presented:

A. A systematic study which must form the foundation for all other inquiries. This has been attempted in a monograph which Dr. Bartsch now has in press.

B. A study of the range of distribution of the various species and their relative abundance.

C. An examination of the physical oceanographic conditions that determine their distribution.

D. A study of the life histories of the various forms.

The second paper of the evening was *The floral alphabet of the Celts*, by IVAR TIDESTROM.

The speaker sketched the distribution of the Celts from Spain to Ireland, Wales and Western Scotland. He proceeded to show how the names of the letters of their alphabet were taken from the names of trees and shrubs beginning with the same sound, the species selected being those of wide occurrence in the Celtic territory. The letter corresponding to our *b*, for instance, was called beith, the Celtic word for birch; *g* was called gort, the name of ivy; and so on. The speaker referred to some of the folklore of the Celts. At the conclusion Miss E. A. Celander sang a Swedish folk-song based upon an old Celtic tradition.

638TH MEETING

The 638th meeting was held at the Cosmos Club on April 1, 1922 with President VERNON BAILEY in the chair and 69 persons present. HENRY HOYT BARROW, LYNN C. DRAKE, FRANK G. GRIMES, SMITH RILEY, and J. R. SCHRAMM were elected to membership.

The first paper of the evening was *Wild flowers that need protection*, by P. L. RICKER.

The speaker first told of the organization, history and aims of the Wild Flower Preservation Society of America. He then discussed the need of protection for many kinds of wild flowers that are approaching extinction in areas near towns, and showed a large number of colored lantern slides of wild flowers of the region about Washington, with some comments on rarity, danger of pulling up the roots in picking, etc. At the conclusion he distributed some leaflets of the Society.

The second paper of the evening, *Hunting fossil vertebrates in southeastern Arizona* was called for but the speaker, J. W. GIDLEY, was not present.

Reverting to the order of *Short notes*, Dr. SHUFELDT said he had found a method of blocking out undesirable backgrounds by the use of small wedges of rubber, illustrating by lantern slides taken in the National Museum, but provided with new backgrounds of outdoor scenes. He also devised the use of an umbrella in taking pictures of wild flowers in the sun, to get better detail by shading the object during exposure. He showed a copy of a new nature magazine, just started in England, called *Nature Land*, edited by Graham Renshaw, and published in Manchester.

Mr. HITCHCOCK asked information on some points in photographing flowers in nature, which was supplied by Mr. Shoemaker. The main difficulty, he said, is wind. A lens of rather long focus is best.

The president called upon Dr. W. J. HOLLAND, director of the Carnegie Museum in Pittsburgh, for remarks. Dr. HOLLAND responded with a very entertaining account of the circumstances leading up to the discovery of *Diplodocus carnegiei*, an immense fossil reptile, and how he came, with the financial support of Mr. Carnegie, to present plaster casts of the famous skeleton now in Carnegie Museum to several of the largest museums in foreign countries. He also told of the Dinosaur quarry opened on Green River in Utah by his Museum, and how on the opening of the region to settlement it was found necessary to designate as "Dinosaur Monument," and to withhold from entry, eighty acres of land including the quarry.

639TH MEETING

The 639th meeting was held at the Cosmos Club on April 15, 1922, with President BAILEY in the chair. ROBERTO DABBENE, WM. A. DAYTON, GEO. C. HEDGCOCK, ERNEST KNAEBEL, J. PARKER NORRIS, JR., WILSON POPENOE, PAUL G. RUSSELL, ALDEN SAMPSON, and JOSEPH H. WALTON, were elected to membership

R. P. COWLES: *A hydrographic and biological survey of Chesapeake Bay.*

The bay is comparatively shallow, with some deep holes along the east shore. The bottom is composed of various materials,—mud, gravel, sand, peat, fuller's earth, clay, and oyster shells. The temperature is warmest at the surface and decreases downward during the warm part of the year, April, June and July and August; in March and September it is about the same at all depths; while in the colder months it is colder at the surface and becomes warmer at greater depths.

The large amount of fresh water meets the salt water of the ocean and mixes only imperfectly, the more saline water being heavier and lying somewhat underneath the fresh water. By means of the current meter it has been found that the surface water may be moving down the Bay while the deeper is moving up in the opposite direction; at other times the surface may be almost stagnant while the deeper portion may be in motion either up or down the Bay. The water has usually a slightly alkaline reaction, but in a few regions it is slightly acid, indicating pollution.

Any or all these physical data may have an important bearing on the distribution and activities of the animals and plants in the Bay.

After describing the various instruments used in making observations, and the many cruises taken by the small government vessel used for several years past, Professor Cowles summarized the practical bearing of the work as follows:

First, an effort has been made to determine the normal biological and physical conditions throughout the year, so that when great mortality of fishes,

oysters, clams, crabs, etc., occurs there will be normal data at hand from which to determine the abnormal conditions that bring about the trouble.

Second, to learn all that is possible concerning the movement of layers of water of different density, different temperatures and different plankton content (fish food value) in the hope that the information may throw light on the migration of fishes and crabs at certain times of the year.

Third, to study especially the fauna of the deep holes which occur in many places.

Fourth, to study the so-called "barren bottoms," at the mouths of rivers.

Fifth, to gather as much information as possible which will bear on the conservation of the fisheries resources of Chesapeake Bay.

In discussion Mr. HITCHCOCK said that in British Guiana there is a tide of several feet for 60 miles up certain rivers, and the mangrove grows up that far, showing that salt water comes up underneath the fresh.

R. W. SHUFELDT: *Observations on the fauna and flora of the District of Columbia.* In the paper, which was illustrated with a large number of excellent lantern slides made by the speaker, a general review of the more common or noted animals and plants was given.

640TH MEETING

The 640th meeting was held at the Cosmos Club on April 29, 1922, with President BAILEY in the chair and 67 persons present. LEE M. HUTCHINS, H. B. HUMPHREY, F. E. KEMPTON, MISS GRACE HOLMES, MISS MARY BRADLEY, and MRS. THEODORE KNAPPEN were elected to membership.

The speaker of the evening, Dr. WM. E. RITTER, of the Scripps Institution for Biological Research, was then introduced by Dr. L. O. HOWARD. Dr. Ritter then addressed the Society on *The usefulness and the peril of the laboratory method in biology.*

The speaker himself had had an extended training some years ago in the best laboratories in existence, and as a university professor he carried on the method in educating a large number of college students, so that he was well prepared to discuss the good points of this educational method. Nevertheless he had come to appreciate very keenly the gulf too often existing between academic science, or more particularly academic biology, and any phase of actual human life. He quoted from Wm. Bateson and L. O. Howard on the same line.

The usefulness of the laboratory he found to be unquestioned in the following matters: (*a*) Phenomena concerning which no positive knowledge whatever can be gained without laboratory studies. (*b*) Phenomena concerning which very little positive knowledge can be gained without a combination of "field" and laboratory studies. (*c*) Phenomena concerning which no positive knowledge whatever can be gained in the laboratory (negative utility of laboratory).

The perils of the laboratory are: (*a*) Laboratory necessarily limited to *samples* of nature; hence (*b*) Laboratory procedure necessarily restricted mostly to *analysis;* and to *deductive* reasoning so far as the interpretation of actual nature is concerned. And (*c*) Necessarily tends to beget *laboratory-mindedness,* and mental and social isolation. (*d*) There is a similarity between *monasticism* in religion and *laboratorism* in science.

He proposed the following steps to remedy the situation: (*a*) Preliminary instruction of all would-be scientists with three-fold end in view: (1) to

help them see that all science is *adaptive;* (2) to secure and strengthen them in *natural-mindedness;* (3) to help them acquire the *mental technique* common to all natural knowledge.

(*b*) Coordination in research and teaching of the analytic and deductive procedure of the laboratory with the synthetic and inductive procedure of the field, by (1) carrying the laboratory method into the field as far as possible; and (2) wider and more fully developed application of the statistical method.

(*c*) Preserve in the investigator consciousness of *interdependence* and human meaning of all special sciences.

At the conclusion of the address, which was received with close attention and high appreciation, Dr. HOWARD called on Professor D. H. CAMPBELL, of Stanford University, to lead the discussion.

Professor CAMPBELL said he agreed with much, but not quite with all, that had been said. Research he thought a legitimate and necessary function of universities; and this would generally involve complex highly specialized laboratory processes, often without any immediate practical aim in view. Research cannot be limited to lines in which the application to human life can be seen at the start. Brief remarks were contributed by Messrs. HITCHCOCK, DOOLITTLE, MANN, SLOSSON, HOWARD, SCHMID, LYON, and ALDRICH.

J. M. ALDRICH, *Recording Secretary.*

ENTOMOLOGICAL SOCIETY

343RD MEETING

The 343rd meeting was held November 3, 1921, at the National Museum, with President WALTON in the chair and 35 members and 4 visitors. New member: CARLO ZEIMET, Bureau of Entomology.

L. L. BUCHANAN: *Coleoptera in bird stomachs.*

In determining the coleopterous food of wild birds it is frequently necessary to identify fragments. In this work the form of the sclerites and the sculpturing of the surface are the best guides, and their determination requires an intimate knowledge of the many groups. Apparently the action of the digestive juice causes marked changes in color so that this is misleading. Very rare species are sometimes found in good condition in the stomachs.

In discussing Mr. BUCHANAN'S paper Mr. ROHWER said that the birds often collect something rare in Hymenoptera but that many of the fragments from the stomach were not in condition to permit positive identification. The determination of these fragments was a good test of one's knowledge of the group and might be treated as a game of skill.

N. E. MCINDOO: *Glandular structure of the abdominal appendages of a termite guest* (Spirachtha).

The staphylinid beetles discussed, about the size of a common pin head, were collected by EMERSON in termite nests in British Guiana and were identified by Mann as two new species. They are most remarkable in that the fat abdomen bends forward and lies directly over the thorax and head, and that the abdomen bears three pairs of large fleshy appendages, whose only function seems to be to furnish a supposedly nutritive food for the termites, which have a habit of licking these appendages. The internal anatomy of the appendages is the most peculiar of any yet described. Each appendage is a thick-walled tube or slender sac, completely filled with blood. Lying in the thick walls are countless gland cells whose inner ends are bathed by the

blood, and whose outer ends are attached to the spongy, inner layer of the integument which serves as a reservoir. The gland cells extract a substance from the blood and store it in the reservoir, from which it passes to the exterior through many tiny pores lying in the outer layer of the integument. Once on the integument, the secretion evidently spreads out in a film over the entire surface of the appendages and abdomen.

This paper was illustrated by two anatomical charts which were explained in detail.

Notes and exhibition of specimens

A. N. CAUDELL exhibited a specimen of a remarkable katydid, the recently described *Inscudderia taxodii* Caudell, which feeds only on cypress in the southeastern United States.

Prof. CARL J. DRAKE spoke of collecting on cypress in Mississippi and Louisiana, stating that certain jassids and tingids confine their attack to this tree.

Mr. ROHWER stated that one of two species of horntails seem to breed only on cypress, and that certain parasites of wood-boring Coleoptera also seem to confine themselves to this tree but are not particular as to the systematic position of their insect hosts.

WM. MIDDLETON stated that he had on October 6, 1921, liberated 20,000 adults of *Schedius kuvanae* Howard in Washington, D. C. This insect is a chalcid egg parasite of the gypsy moth. The liberation was made on some trees along B St., on the north side of the Museum, which had a large number of egg masses of the white-marked tussock moth. The parasite has been found to attack the egg of this moth under laboratory conditions and it is hoped that it will be useful in aiding in controlling it here. This experiment is a part of Dr. HOWARD's plan for getting the utmost possible good from such parasitic insects as are introduced into this country.

S. A. ROHWER said he was glad this liberation of parasites was recorded and hoped that all such liberations would be made matters of record and placed available to all specialists. Unless this is done, the specialist is often puzzled when dealing with distribution of species and often has trouble in making identifications.

As an illustration of the phenomenon of predaceous and parasitic insects confining their attacks to those insects which infest a given plant rather than to a given host species or genus, J. A. HYSLOP discussed the two common species of the genus *Alaus*, *A. oculatus* and *A. myops*. The larvae of both of these beetles are exclusively predaceous, feeding on several species of wood-boring larvae, but, despite the fact that they are not wood feeders, *A. oculatus* is always found in deciduous trees and *A. myops* invariably in conifers.

Dr. A. C. BAKER reported the results of some rearing experiments with the apple-grain aphis (the *Aphis avenae* of some American authors). He pointed out that the theory of evolution based on natural selection as propounded by DARWIN has been discarded by most of the experimental workers in zoology. Darwin based his theory on small continuous variations while most of these recent workers pin their faith to discontinuous variations. In the mean time JOHANNSEN established his pure line theory which claims that self-fertilized forms or forms reproducing as in parthenogenesis will remain true showing only fluctuations. Finally LOTSY has recently dispensed altogether with variations. "The cause of evolution lies in the interaction

of two gametes of different constitution." If this were so there could naturally be no true variation in a parthenogenetic line.

EWING had reared the species under discussion for 87 parthenogenetic generations and secured no modifications. His conclusions therefore agree with the usual pure line conception and would tend to support Lotsy's theory. The results obtained here, however, are quite different. There appeared in the parthenogenetic rearings a form which had dropped one entire segment from the antennae. This reproduced true until the winter's frost closed the line. Apterous and winged forms were obtained and even intermediates between these two forms, all lacking the one segment.

We have here then a case where a new form has arisen in a parthenogenetic line—a mutation if you wish. There seems only one way to interpret it. Mutations may arise in pure line parthenogenetic reproduction as well as through the interaction of two different gametes. This granted, Lotsy's theory collapses and the pure line theory as often expressed needs modification.

Micrographs of these forms have been prepared and will in due course be published.

H. S. BARBER reported on the injury to the putting greens of the Columbia Country Club near Chevy Chase, Maryland, by the larvae of the carabid beetle *Agonoderus lineola*. The investigation was made in late August by P. L. RICKER of the Bureau of Plant Industry. The injury was very severe in spots and examination of the contents of the alimentary tract of larvae disclosed chiefly grass roots. Poison baits and sprays apparently were of little value in preventing the damage, and it was recommended that surface fumigation with paradichlorobenzine under tarpaulins be tested.

J. C. BRIDWELL told of the various insects that he had found using as nesting places the galleries of a borer in a rotten stump. *Osmia lignaria* Say was in the fully developed adult stage. Some individuals had been parasitized by *Chrysis* (*Holochrysis*) *hilaris* Dahlb., which had attacked the bee larva after it had spun its cocoon, as was shown by the fact that the *Chrysis* cocoon was always enclosed by the *Osmia* cocoon. Nymphs of the mite genus *Trichotarsus* were associated with these bees. Dead and molded adults of *Typoxylon albopilosum* Fox were found in nests in the pupal chambers, and other cells filled with spiders certainly stored by this species. The nesting habits of this *Trypoxylon* heretofore have been unknown. Other pupal chambers contained the remains of the cockroach *Parcoblatta pennsylvanica* DeGeer, associated with thin silken cocoons thought to be possibly those of one of our two species of *Rhinopsis*, members of a group known to use cockroaches as prey. In branch galleries were cells stored with a large aphid (possibly *Longistigma* according to Dr. Baker), together with cocoons suggested by Mr. Rohwer as possibly those of some Nyssonid. The mite, *Pediculoides ventricosus*, interfered with the rearing of some of the species.

E. R. SASSCER exhibited a base ball, intercepted at quarantine, filled with whole cotton seed.

344TH MEETING

The 344th meeting was held December 1, 1921, at the National Museum, with President WALTON presiding and 33 members and 6 visitors present. Officers for 1922 were elected as follows: *President*, A. B. GAHAN; *First Vice-President*, Dr. ADAM G. BÖVING; *Second Vice-President*, R. A. CUSHMAN; *Recording Secretary*, C. T. GREENE; *Editor*, Dr. A. C. BAKER; *Corresponding*

Secretary-Treasurer, S. A. ROHWER. *Additional members of Executive Committee*, Dr. A. L. QUAINTANCE, A. N. CAUDELL, Dr. J. M. ALDRICH. *Vice President of the Washington Academy of Sciences*, S. A. ROHWER. The program was as follows:

S. HADWEN: *Oestridae.*

This talk consisted of an account, illustrated by specimens and photographs, of the speaker's investigation into the habits and control of the reindeer nose bot fly, *Cephenomyia trompe* L., and the reindeer warble, *Oedemagena tarandi* L.

Notes and exhibition of specimens

Dr. HOWARD, Mr. SCHWARZ, and Mr. CAUDELL gave brief reminiscences of the late Dr. W. H. FOX.

Mr. ROHWER exhibited some letters from the late H. F. BASSETT to Dr. LINTNER and read one relating to one of Dr. Lintner's reports.

C. J. BRIDWELL exhibited the elytra of an *Elodes* on which he has found two eggs of a Tachinid parasite and from which he had removed two larvae of the fly. He commented on the similarity in the method of attachment of the egg to that of the Bruchidae, by a firm cement which gives the larva a good purchase for penetrating the hard elytron, in the same manner as the bruchid larva penetrates the hard shell of the seed.

Dr. ALDRICH was reminded by Mr. Bridwell's remarks of the Tachinid eggs that are sometimes found on the adults of the potato beetle, stating that nothing has ever been reared from these eggs and that they cannot be those of *Doryphorophaga* since this has a piercer and probably deposits its eggs within the host.

Dr. EWING had found these eggs and had succeeded in getting them to hatch, but had never reared the adult fly.

Mr. CAUDELL told of having received specimens of *Zorotypus* from Hawaii and thought it probably a species introduced from the East Indies. He also exhibited specimens of a rare walkingstick-like mantid that Dr. C. J. DRAKE had found in considerable numbers in Mississippi.

Mr. CUSHMAN spoke of the confusion resulting from an old misdetermination of *Habrocracon brevicornis* (Wesmael), whereby the name has long been associated with the common parasite of stored grain insects. The recent rearing of the true *brevicornis* from the European Corn Borer in imported material has been the means of correcting the error.

Mr. GAHAN discussed the habits of a recently discovered parasite of *Diabrotica vittata* adults, *Syrrhizus* n. sp., as given him by the discoverer, Mr. W. V. BALDUFF, of the Ohio State Agricultural Experiment Station. Mr. Gahan outlined the similarities and differences between the habits of this insect and of the common parasite of lady-bird beetles, *Dinocampus terminatus* Nees.

R. A. CUSHMAN, *Recording Secretary.*